

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 7/21/21**

Leveraging over 15 years of support to HHS for medical consequence modeling and our proprietary artificial intelligence (AI) models, IEM believes that our Coronavirus model outputs can be used to assist localities and their medical facilities to better prepare for an increase in hospitalizations, to better plan for and locate drive-through testing facilities, and to determine where increased levels of transmission may be occurring.

**We have been refining our AI model over the past month and are confident in its ability to provide accurate 7-day projections that can be used for operational and logistical planning.**

**AI-based Model Background**

IEM is currently using an AI model to fit data from various sources and project new cases of COVID-19. We do not assume the average number of secondary infections (R-value) stays the same over time. IEM's AI model finds the best R-value over time to evaluate how it changes over the course of the outbreak. The IEM modeling team is running ~11 million simulations to fit each state's data and using the best fit for the R-value to project new cases over the next 7 days. The AI models are executed on a daily basis to evaluate the changing dynamics of the COVID-19 pandemic. Our projections have typically been within 10%, and are often within 5%, of actual confirmed cases.

The projections shown in this document are based on data pulled in as of 7/21/21 9 a.m.

**Please provide any feedback or send any questions that you might have to us. We are continually updating and improving the model, so your feedback is critical.**

**Also, if you have more current or refined data for your State, Commonwealth or Territory that you would like IEM to factor in, please let us know.**

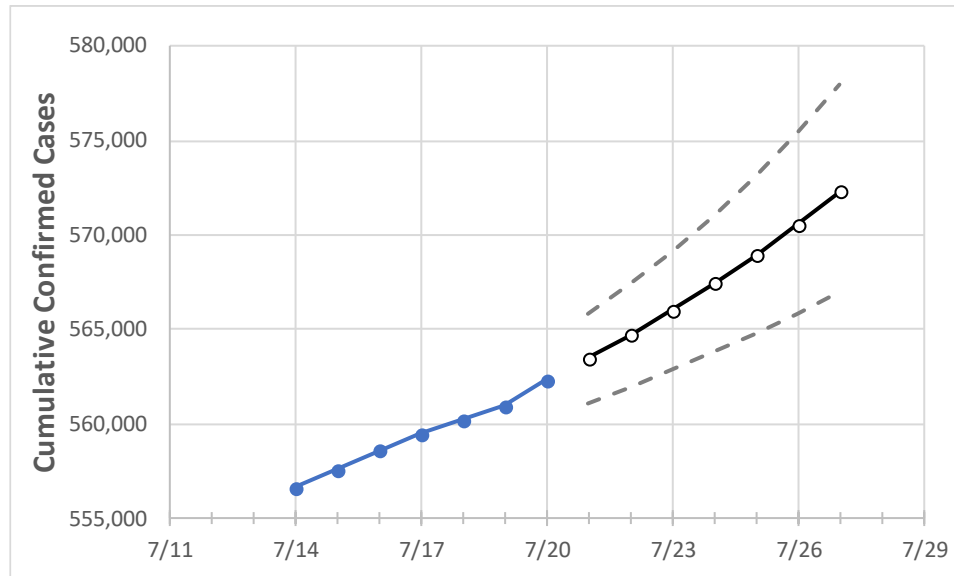
**IEM's Modeling Lead**

Dr. Prasith "Sid" Baccam is a **Computational Epidemiologist expert** at IEM with more than **20 years of experience in medical consequence modeling and simulation of disease outbreaks** and medical consequences following hypothetical attacks with biological agents or emerging infectious diseases. He develops key simulation models and decision support tools at IEM, specializing in public health, disaster response, and medical countermeasures (MCM) to enhance data-driven decision making and improve modeling assumptions.

Upon receiving his **Ph.D. in Applied Mathematics and Immunobiology** at Iowa State University, Dr. Baccam worked as a Postdoctoral Research Associate at Los Alamos National Laboratory where he focused on researching viral and immunological modeling. After his stint at Los Alamos, Dr. Baccam has served as Task Lead in multiple public health projects have allowed him to develop expertise as a mathematical biologist and a leader on high-performance modeling and simulation teams.

He has worked with state and local public health officials as well as Federal agencies, including **HHS**, the Centers for Disease Control and Prevention (**CDC**), and the Department of Homeland Security (**DHS**). Dr. Baccam has published numerous papers on public health response models and implications on policy and has been invited to participate in workshops and symposiums held by the Institute of Medicine (now the National Academy of Health). His modeling results have been briefed to the **Executive Office of the President** and informed two presidential policy actions.

## Alabama State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27
Alabama	559,478	560,202	560,920	562,311	563,464	564,680	566,008	567,413	568,911	570,540	572,308

*Note: The State's projection shows a "best estimate" curve (the solid line with circles) and the dotted lines are the upper and lower estimates around that best estimate. Our projections have typically been within 10%, and are often within 5%, of actual confirmed cases.*

## Alabama Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27
Jefferson	82,150	82,231	82,320	82,487	82,607	82,735	82,876	83,027	83,189	83,359	83,549
Lee	16,561	16,574	16,587	16,630	16,656	16,684	16,714	16,747	16,781	16,819	16,859
Madison	36,265	36,309	36,330	36,372	36,419	36,471	36,524	36,581	36,640	36,705	36,772
Marshall	12,639	12,655	12,656	12,671	12,684	12,697	12,712	12,727	12,744	12,761	12,779
Mobile	43,793	43,941	44,111	44,363	44,587	44,832	45,096	45,386	45,702	46,055	46,438
Montgomery	25,431	25,453	25,470	25,521	25,563	25,609	25,657	25,711	25,770	25,833	25,900
Shelby	26,159	26,194	26,225	26,270	26,317	26,367	26,419	26,476	26,535	26,597	26,664
Tuscaloosa	26,419	26,433	26,463	26,491	26,510	26,531	26,552	26,576	26,600	26,625	26,652

Some recipients of our daily COVID-19 short-term (7 day) projections have requested projections of demand for: hospital bed, intensive care unit (ICU) beds, and mechanical ventilation. We realize that different states and localities will have different characteristics for hospital demand of COVID-19 cases, and we are presenting the best assumptions we could find for those medical demands based on scientific literature and health data reporting. Specifically:

- **Beds:** For hospitalization, we use a range of 10% and 20% of cases require hospitalization based on CDC's report ([MMWR, March 18, 2020](#)) and state reports of COVID-19 cases.
- **ICU:** The CDC report found that 24% of hospitalized cases require ICU care.
- **Ventilators:** Based on clinical data from China and state reports, we assume that 50% of ICU cases require a ventilator.

If you have other estimates for these assumptions, please share them with us as we work to refine our modeling, assumptions, and data on a daily basis.

The medical demands shown in the table assume 20% of **cumulative** confirmed cases require hospitalization. To get the medical demand for the assumption that 10% of confirmed cases require hospitalization, simply divide the demand by 2.

#### Alabama Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	7/17	7/18	7/19	7/20	7/22				7/24				7/26			
Jefferson	82,150	82,231	82,320	82,487	82,735	(16,547)	[3,971]	{1,986}	83,027	(16,605)	[3,985]	{1,993}	83,359	(16,672)	[4,001]	{2,001}
Lee	16,561	16,574	16,587	16,630	16,684	(3,337)	[801]	{400}	16,747	(3,349)	[804]	{402}	16,819	(3,364)	[807]	{404}
Madison	36,265	36,309	36,330	36,372	36,471	(7,294)	[1,751]	{875}	36,581	(7,316)	[1,756]	{878}	36,705	(7,341)	[1,762]	{881}
Marshall	12,639	12,655	12,656	12,671	12,697	(2,539)	[609]	{305}	12,727	(2,545)	[611]	{305}	12,761	(2,552)	[613]	{306}
Mobile	43,793	43,941	44,111	44,363	44,832	(8,966)	[2,152]	{1,076}	45,386	(9,077)	[2,179]	{1,089}	46,055	(9,211)	[2,211]	{1,105}
Montgomery	25,431	25,453	25,470	25,521	25,609	(5,122)	[1,229]	{615}	25,711	(5,142)	[1,234]	{617}	25,833	(5,167)	[1,240]	{620}
Shelby	26,159	26,194	26,225	26,270	26,367	(5,273)	[1,266]	{633}	26,476	(5,295)	[1,271]	{635}	26,597	(5,319)	[1,277]	{638}
Tuscaloosa	26,419	26,433	26,463	26,491	26,531	(5,306)	[1,273]	{637}	26,576	(5,315)	[1,276]	{638}	26,625	(5,325)	[1,278]	{639}

For additional information from IEM, please contact Bryan Koon, Vice President of Emergency Management and Homeland Security at [bryan.koon@iem.com](mailto:bryan.koon@iem.com) or 850-519-7966 or Stephanie Tennyson at [stephanie.tennyson@iem.com](mailto:stephanie.tennyson@iem.com) or 202-309-4257.